

plane GRUMMAN news

Practice is over . . .

The myriad rehearsals slip away and all that has been learned is now performed from beginning to end on a space stage flung open for countless millions to hear and see. Drama and suspense and adventure—real and yet in a world somehow beyond our full comprehension—pour in upon us and leave us limp but exhilarated, and a bit in awe.

For all this is the consequence of a meticulous and superbly coordinated stage plan incredible in conception and even more incredible in its precision of performance. Everything (in the old phrase) goes like clockwork.

And so it should: Planning has been as scientifically precise as is possible. All imaginable contingencies have been explored and practiced again and again so as to prevent surprises. All systems have built-in redundancies so that a failure is immediately compensated for by a backup system. And—the prime human factor—each astronaut has gone through, studied, and practiced in simulators or simulations (as Fred Haise does here) every single step of the mission plan for months and months and months. They *know* their way to the moon and back . . .

and starting tomorrow the real thing begins . . .

KENNEDY SPACE CENTER—Tomorrow at 2:13 p.m. Eastern Standard Time Apollo 13 is scheduled to lift off from the Kennedy Space Center here on Merritt Island and set its sights on the moon, where, for the third time in history, two American astronauts are to walk on the barren satellite and explore it.

At 3:13 p.m. Tuesday the 21st of April the 10-day mission is to end with splashdown in the Pacific Ocean about 210 nautical miles from Christmas Island, south of Hawaii.

This trip is to be tougher than either two of the preceding space jaunts: the Command Module will come in very close to the lunar surface, the terrain around the landing site (Fra Mauro) is extremely rugged, and the moon-walkers will be more heavily burdened with jobs to perform.

Navy Capt. Jim Lovell Jr. will command the Apollo 13 team and Fred Haise Jr. will be LM pilot. Making the lunar orbits, snapping photos, and—possibly—trying to rescue the LM duo should unexpected difficulties crop up, will be Navy Lt. Cdr. Tom Mattingly. Dean of the crew is Lovell, who's spent more time in space than any other astronaut.

"All preparations for LM's role in this moon shot have gone along with incredible smoothness," says Vice President George Skurla, Grumman's manager of Operations at KSC. "LM-7 was in the Vehicle Assembly Building only three days, and that was for stacking the modules atop the Saturn V launch vehicle. The countdown demonstration went without a hitch. All teams performed with quiet professionalism."



NASA photo

Quiet, yes . . . but no one was blase. Skurla mentioned that the undercurrent of excitement grew stronger as each day came closer to liftoff. And as for the notion that the launch, moon-mission, recovery sequence might become old hat, well, forget it. The same intense dedication, concern, and tingling of spine were all there.

"There was no complacency," said Al Beauregard, Grumman's LM-7 spacecraft director. "Morale is very high."

Maybe part of the reason behind that is the realization that *this* particular mission will be more taxing than the others—and there's a chance for a tremendous geological reward. Put another way, the tougher the challenge, the greater the chance of high response. Think about

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Grumman Corporation names Carr, Rockwell to new posts

John Carr was elected Vice President of Grumman Corporation and Larry Rockwell, Corporate Secretary, at a meeting of the Board of Directors on March 24.

John Carr, in addition to being a Vice President of Grumman Corporation, continues his heavy responsibilities as General Counsel of the Corporation. He is also Secretary of Grumman Data Systems and of Montauk Aero Corporation, both subsidiaries of Grumman Corporation.

Before he came to Grumman in 1955, Carr had been on quite intimate terms with the Company in another capacity: he flew Wildcats, Avengers, and Hellcats in World War II, and, what was a little unusual, served in the Pacific aboard a British carrier that also had

Martlets (British Wildcats) in its fraternity.

Carr is a graduate of Williams College, Class of 1942. After his tour with the Navy, '42-'45, he got his law degree from Harvard and served as an attorney with Sage, Gray, Todd & Sims in New York for two years. Then from 1950 to 1953 he was with the office of the General Counsel, Department of the Navy, and for the following two years was contract negotiator with Minneapolis-Honeywell Regulator Company.

He joined Grumman as an attorney in 1955, and in 1960 was appointed General Counsel. From May '66 to June '69 he served as Corporate Secretary of Grumman Aircraft, and from July of '69 to March of '70, of Grumman Corporation.

John Carr is a member of the Federal and American Bar Associations and vice chairman of the Procurement & Finance Committee of AIA. He is a past president of the Cold Spring Harbor Board of Education and author of "An Industry Attitude Toward Government-Required Warranty Clauses," Government Contracts Monograph No. 2, published by George Washington University.

The easy-mannered six-footer enjoys golf and swimming and "watching the rest of my family ski." He and his wife, Ruth, and Douglas, Jeffrey, and Elizabeth, ranging from 14 to 6, live in Cold Spring Harbor.

Wide experience

Lawrence (Larry) Rockwell, newly elected Secretary of Grumman Corporation, has been organizing and explaining and assessing many phases of Grumman affairs since he first joined the Company 29 years ago. In 1945, after more than three years of Army service (Ordnance Department with the rank of major), he was named manager of Corporate and Employee Insurance.

In 1958 he became secretary of the Employees Pension Board and Assistant Secretary of the Corporation. Five years later, upon a reorganization in the Personnel Department, he was appointed manager of Insurance & Personnel Records.

A new task was conferred on Rockwell in 1965: introducing the Employee Investment Plan into the Company. That done (more than 16,000 joined it), he spent a year in Company long-range planning, and then he became increasingly involved with the Corporate Secretary area and stockholder relations. He is still secretary of the Pension Board and a member of the Investment Plan Committee. His new post, that of Corporate Secretary, "adds one more job."

Rockwell's varied experience does not go untapped by the community. A resident of Nissequogue (St. James), he serves as a trustee of the Village and of the St. Johnland Home for the Aged, and as chairman of the Board of the Smithtown Library. He is also a member of the Board of Managers of the Church Charities Foundation. He and his wife, Harriette, have a son, Lawrence Jr., in college, another, Norman, in high school, and a daughter, Diana, in day school.



John Carr



Larry Rockwell

National Space Club honors Company for outstanding contributions on Apollo

All Grumman is complimented for its contribution "to the missile, aircraft, and space field" in 1969 by being awarded the Nelson P. Jackson Aerospace Award by the National Space Club. President Lew Evans accepted a plaque presented to him by Astronaut Bill Anders, chairman of the National Aeronautics & Space Council, who called Grumman Aerospace "a great team that has contributed so much to our country's aerospace effort."

Engraved on the plaque is the citation: "To the outstanding team of dedicated men and women of the Grumman Corporation for their history-making contribution in enabling Man for the first time to set foot on another celestial body, begin its exploration, and return safely to Earth. Apollos 9 and 10 magnificently demonstrated the capabilities and reliability of the lunar module and set the stage for the first manned lunar landing—the historic voyage of Apollo 11."

"Soon thereafter, Man's exploration of our nearest neighbor in space was still further advanced when the lunar module of Apollo 12 landed only a few feet from its planned destination on the Moon's Ocean of Storms.

"With these accomplishments the United States achieved its most prominent goal in space to date. Now the door has been opened to an almost limitless future in which the management skills perfected in space endeavors will also be available to serve this Nation in dealing with the urgent priorities of our environment and our cities."

The presentation was made at the 13th annual Goddard Memorial Dinner in Washington, D. C., on March 18.

OBITUARIES

Plane News has received word that death has come to the Grumman personnel listed below. We extend sincere sympathy to relatives and friends.

MARGARETHA T. LANG of Plant 2 Food Services died March 24. She had been with Grumman 12 years and was 55 years old. She lived at 300 Dawson La., Hicksville.

VICTOR M. GESUALDI JR. died March 29 at the age of 36. He had been with the Company since 1958 and his home was at 18 Astor St., Greenlawn. He worked in Facilities Maintenance, Plant 13, Farmingdale.

CARMEN SANGINARIO of Analog Hybrid Applications, Plant 5, died March 31 at the age of 47. He had been with Grumman for 13 years, and he lived at 734 Carman Ave., Westbury.

FRANK SCIRICA of Plant 5 Machine Shop died April 2. He was 56 years old and had been with Grumman since 1964. His home was at 65 Lindenmere Dr., Merrick.

RALPH W. BONNESS of Plant Protection, Plant 6, died April 4 at the age of 53. He had been with the Company since 1956, and he lived at 54 Pace Ave., Bellport.

Help yourself!

You are invited to join in a survey to help the Kidney Foundation help you. In a pilot detection program being conducted by the Kidney Foundation and Lions Clubs of Nassau County, Grumman is making test kits available in Company First Aid stations. By means of a simple test, you can discover whether you have a condition that requires treatment. In a Nassau County school, for example, 20 children were found through this testing process to have possible kidney disease.

During April, stop at the nearest First Aid room to get the details. Over eight million persons in the United States are said to have undetected kidney disorders. Serious complications may be avoided by early detection and prompt medical care, the Foundation points out.

Short shots

U.S. Representative Lester Wolff will be at the Garden City Hotel, May 9, as guest luncheon speaker at the annual seminar of the L.I. Chapter of the National Contract Management Association. His topic: L.I. Business Needs "SUBport." Welcoming remarks by Vice President Burt Stern of Grumman Data Systems, president of the L.I. chapter, will kick off a day-long program of discussions on business opportunities and problems for small and large corporations. Also on the agenda: Director of Material George Devine, who will speak on "Problems of Major Systems Contractors." . . . The "Boomers" of Attack Squadron 165 seem to have something going with the landing officer aboard the USS America. During operations in the Mediterranean, pilots and bombardier/navigators of the A-6 Intruder squadron have recorded the 56,000th, 57,000th, and 58,000th landings aboard the big carrier. The most recent milestone occurred on the last day of January when VA-165 skipper Cdr. Fred Backman and his B/N Lt. Cdr. Jack Hawley hit the deck. How about the 59,000th, fellas?

Bob Bolton has been named manager of Material-Space Programs "with responsibility for all the functions of the Material organization on all space programs," says George Devine, director of Material. Bob, who will continue as Material manager on the Space Shuttle Proposal, is in Plant 25 on Ext. 7486. . . . Surfcasters and those who take their fishing a little more leisurely were alerted recently to the start of the 11th annual Jones Beach, Captree, and Robert Moses State Parks fishing contests, which will run through October 21. Contest rules and entry forms are available at official weigh-in stations at Jones, Captree, and Oak beaches. . . . Vice President George Skurla saluted Albert Narvaez of Configuration Planning as "Heads-Up Man of the Month" at Kennedy Space Center for his contributions and outstanding performance.

Ship 4th orbiting observatory to Goddard for flight testing

The Grumman-Goddard Orbiting Astronomical Observatory, OAO-4, reached Goddard Space Flight Center from Bethpage on April 1 to start a long series of acceptance tests. Carrying its Princeton Experiment Package (PEP) and a secondary experiment from the University College of London, the Observatory is to be launched from Cape Kennedy in December of 1971.

Since tests have been going well on OAO-3 at GSFC, and the two-ton OAO-II has just racked up its 7,050th orbit about the earth, OAO Program personnel are beginning to "think three"—three Orbiting Astronomical Observatories in the sky in 1971, that is. Commenting on the success of OAO-II, Dr. Ted Houck, University of Wisconsin astronomer, has said, "... for the first time we have a controllable stable platform observatory that is working consistently free from the scattered light of the sun, moon, and other sources that plague ground-based observers. With OAO-II we record many more phenomena in the heavens, within an accuracy of one percent."

Ted Moorman is OAO Program manager and Hal Wexler, assistant Program manager. About 120 Grumman personnel at GSFC are conducting the acceptance test program on OAO-3 and -4.

Stuart rallies to Project Sterling

An enthusiastic "Project Sterling Rally" staged recently has pumped new blood into the program at Plant 77 in Stuart, Fla.

According to Bill Cobey, director of the Stuart Work Center, the rally was held to introduce a new phase of the Sterling campaign, in which employees sign pledge cards to adhere to the strict structure of the program in which "everything is done right—the first time." The Stuart facility is eligible to receive a Participation Award from the U.S. Aviation Systems Command as 85 percent submit their pledges.

Several U.S. Army officials appeared at the rally, including Col. Arthur C. Bowdoin, Commanding Officer of Grumman Plant Activity at Stuart, who stressed the individual's role in Project Sterling and how teamwork results in better quality products.

Emanuel Kintisch, Chief of Procurement for the Department of the Army, who was at the Stuart facility on a routine tour, emphasized that Project Sterling helps the Company reduce costs and remain competitive. Then Col. John A. Love, Mohawk Program Manager from AVSCOM, St. Louis, related how the name "Project Sterling" was coined from the famous quote of Admiral John McCain, which compared the name Grumman on an airplane to that of Sterling on silver.

Five members of the Grumman staff at Stuart, Jim Dowling of Quality Control, George Sanders of Production, Doug Shelton and Ray Goodell of the Proto Shop, and Charlie Kelly of Product Support were presented Project Sterling awards during the rally.

Summer students on their own

Due to sharply rising costs of tuition at colleges and universities, and corporate budgetary restrictions, the Training and Development Department has announced that we are unable to reimburse employees for courses taken during the summer sessions this year.

"The new scholarship rules, which were introduced last fall, were effective in reducing overall expenditures while sustaining an excellent program of educational assistance," says Art Gilmore, director of Training and Development.

Gilmore emphasized that the only courses affected by this announcement are those given in the summer. Scholars enrolled in courses this spring and fall will be reimbursed under the normal program procedures.

ILS goes on the road

The Product Support Department sent its ILS show on the road a couple of weeks ago, and judging by the reviews it got, it may well play to a few more out-of-town audiences in upcoming weeks. ILS (Integrated Logistics Support) promises to be a vital factor in the management of the F-14 Program.

Exactly what is ILS—and why is it so vital right now to Grumman and the Navy? Vice President Ed Dalva has said that "the ILS management of the F-14 will give the Navy, for the first time in its history, an operational aircraft that is completely supportable from its initial introduction into the Fleet."

ILS, then, is a way to get really effective support of F-14 systems and equipment. It involves maintainability, reliability, planned maintenance, spares and repair parts, tools and test equipment, transportation and



For '71 launch. Looking like the complex orbiting observatory that it is, OAO-4 will carry Princeton instruments for seeking high-resolution ultra-violet data far out in space. Just before it was shipped to Goddard Space Flight Center, photographer Al Creech shot the vehicle in Plant 5 Clean Room with Bob Cheshire, Pete Fugaro of Structural Engineering, and Bill Vice of Inspection. Skins were added before shipment.

handling, facilities identification and selection, technical manuals, personnel and training, contract maintenance, and funding.

Since last spring, about 200 people from major operating areas within Grumman have been going to school on the subject, and its popularity might be judged by the fact that all the participants completed the 10-hour course on their own time.

An observer from the Naval Air Technical Services Facility attended one of the two-hour sessions and carried word to the home office in Philadelphia about what Grumman was doing. It wasn't long before Ben Burns, who teaches the ILS course, got his traveling orders. In Philadelphia he made the same presentation to nearly 70 representatives of NATSF. It doesn't end there, either. Another observer, this time from the Naval Aviation Engineering Service Unit, saw the show and carried the good word back to his home base. Very likely, the ILS show will get another out-of-town booking. Was it David Merrick who said: "The only rave notice that matters is the one from a satisfied customer."

Launch school for programmers

It wasn't too long ago that alarms were sounding throughout the business world and a cry went up: Save us! We're being buried under a growing mountain of paperwork!

And then, from out of the technological world, came something new, the computer. Highly sophisticated machines that do in a twinkling what unaided man might take days, weeks, or even months to do, roared onto the scene and revolutionized business procedures.

By breaking through the information log-jam, speed, accuracy, and efficiency became sharp tools of progress. And new jobs were born—particularly data systems programmers. To meet that mushrooming need, Grumman Data Systems Corporation set up its own Data Systems Institute to teach computer programming. It is located at 17 West John Street, Hicksville.

Tomorrow, from 9 a.m. to 2 p.m., the Institute will hold open house, with a film on computers, coffee and doughnuts, and easy conversation about the Institute's course offerings and the computer field in general.

The Institute opened its doors in mid-February to train programmers. It's a comprehensive 300-hour course that can be taken weekdays, evenings, or Friday evenings plus Saturday. For more information, call 681-8686.

Scott Cobb, director of the GDS Institute, emphasizes that anyone completing the course will emerge as a qualified programmer trainee.

The price of the program is \$1,350. Grummanites and their families receive a 10 percent discount. Anyone who pays in cash for the program gets a \$50 discount. Financial assistance can be arranged.

"About 70 students are now enrolled in the first program," says Mike Barone, deputy director. "They'll learn the fundamentals of data processing, COBOL (Common Business Oriented Language, now the most popular one), FORTRAN (Formula Translation—a more scientifically oriented program), assembler language, and operating systems concepts."

Role of Research— probing the unknown without losing sight of present-day needs

To penetrate the unknown—that, in essence, is the role of all research. It's a vast charter; the constraints are those made by the organization itself, in this case by Grumman.

But after all, how do you define or limit what is unknown? "The best guide you have," says Dr. Charles E. Mack, director of Research for the Company, "is knowledge of the specific technical fields that the Corporation has gone into in some depth."

But that's only a part of it, and certainly hardly enough. Nor is maintaining a technological lead (say, in flight mechanics) quite enough. As Mack points out:

"We have to conduct research in areas that we believe will promote the future long-range interests of the Company, and a lot of that work may not be specifically related to present Grumman systems."

That brings research into what many would consider as "fuzzy" or "gray" areas—into regions that are unfamiliar and difficult to relate to a direct, present need. It can exasperate both the insider and the outsider, the researcher who wants to travel well beyond today's conceptions of immediate need, and the layman who demands to know why money and time should be spent on efforts that seem remote, especially when there are real problems that clearly need to be solved right now. It's a classic rift, one that's been around for untold centuries.

How do you solve it? You can't, fully. Instead, you go the route described by Richard Scheuing, who is deputy director of Research:

"There are always far more problems than we can handle with our budget and staff. The heaviest pressure is always on those critical problems that are most immediate and, thus, most clearly defined. These are, at the same time, the most defensible. But it does not necessarily follow that it is in the best long-range interests of the Company that these should only be the ones we select. If productive research is to be accomplished, our people cannot keep switching from one research project to another. Nor can we choose to ignore the immediate, simply because it is immediate."

"So what you do is identify an area that needs investigating, judge its relevance to our business, and make a decision. Identification is the trick. Often it's a question of selecting the best route in light of available information."

Broad scientific base

If that seems as though Research is playing a kind of expensive blindman's buff, well, such is not the case. What happens is that results of past efforts, combined with progress in on-going Research investigations, provide a broad scientific and technological base. Consequently, Research has at any given time, a body of knowledge (solved and partially solved problems) ready to be put to work.

Research has been instrumental in Grumman's entry into many different fields—fields now accepted as essential and productive, fields that might otherwise have been beyond the Company's reach. "It was Research, for example, that launched technology computing systems in Grumman," says Mack, "and it was research that got us into simulation work. The Research Department helped immensely to set the



Research Department's job, says its director, Charlie Mack, is to break through the barriers of today's technology to help develop tomorrow's concepts and product lines. (Photo by Harry Prodromides)

stage for Grumman space endeavors."

The Lunar Module project is a typical illustration. Five years ago, LM engineers were confronted with unsolved problems regarding the possible effects of rocket plume impingement on the vehicle in outer space. This was a little-known area. Because of extensive hypersonic shock tunnel experience accumulated since 1959, Research, in conjunction with LM engineers, was able to devise a technique to measure heat transfer and pressure distributions on scale models of the LM under simulated space vacuum conditions in the Plant 2 shock tunnel. Data resulting from more than 1,500 runs were later confirmed in actual LM flights.

"Research was a department of some dozen people, headed by Dr. Ralph Tripp, when we got started," says Mack. "But size is not the key. What's absolutely essential is quality people: that comes first, always. And we have been working on that. Ten years ago, 16 percent of our personnel had Ph.Ds, 43 percent had Masters, and 41 percent had Bachelors degrees; now we have 52 percent in the Ph.D category, 39 percent with Masters, and 9 percent with a Bachelors. It gives you some idea of how complex and fast-moving our technological world has become."

An advanced degree by itself is not sufficient, Scheuing points out. "Individual uniqueness, skill, creativity, and potential are characteristics of a researcher. One quality we look for is long term commitment to research investigations."

Those investigations in Grumman Research are carried out in six areas:

- Systems Sciences, which includes space flight trajectories, pattern recognition, inertial techniques, marine sciences and oceanography, aerial combat tactics, optical signal processing, etc.
- Fluid Mechanics, including low density flows, subsonic and transonic aerodynamic theory, hypersonics, aerodynamic noise and turbulence, gas radiation and detection physics, and so on

- Nuclear and Radiation Physics, dealing with such matters as radiation survivability and vulnerability, nuclear techniques for materials analysis, and high energy particle physics
- Materials and Structural Mechanics, incorporating nonlinear structural analysis, stress corrosion, oxidation of refractory metals, and high temperature composites
- Geo-Astrophysics, studying planetary and lunar surfaces, air pollution, electrical and thermal properties of materials, and so on
- Life Sciences, including manned systems, and environmental biology

It's a complex bundle of explorations . . . yet, it's only a tiny fraction of the technological questions being raised today. And there'll be even more tomorrow. You can only tackle a few of the problems.

And in doing that, you form a cadre of experts, people who know their specialties backwards and forwards, and who will innovate. In addition, these researchers must be ready to help out on problems that inevitably crop up in other areas of the Company.

Present and future

"We have a responsibility to provide knowledge to current products as well as to future ones," Mack says. "To accomplish this, we continually promote the transfer of technology throughout the Corporation by conveying results of investigations to appropriate sources through consultations, formal reports, memoranda, conferences, and so on. Direct contact, as always, is the best medium of communication."

"Research is not an island unto itself. It's a part of Senior Vice President Grant Hedrick's Technical Operations effort—Product Operations, Space Program Management, and Aircraft Program Management. All are slices of the same pie: technical know-how. We have to work together very closely. Communications lines must always be wide open, for each learns from the other, each makes a vital contribution."

Cohesiveness, then, in the sense of moving toward the same basic target, is indispensable to high-order achievement. And that cohesiveness lies within the distinctly different special fields Research explores by employing individual experts.

It's the constant intermixing of ideas—at symposiums, at outside meetings, at in-house conferences, at libraries, almost anywhere—that forces out new and better ideas. Those are the ideas that keep a Company on its toes. They're the ideas that keep Grumman not only alive, but ahead.

Honored at KSC

Honored for outstanding contributions to the Lunar Module Program, Lee Brandt and Manfred Heinrich of KSC have been invited to be guests of Grumman and NASA, under the Manned Flight Awareness Program, for the Apollo 13 launch. Brandt is from Assembly Test Operations and Heinrich is an Environmental Control System engineer. They join four honorees from Bethpage.

Hey, guys! . . .

How many times has your secretary bailed you out of a potentially embarrassing situation? Maybe she reminded you to attend a meeting, or remembered where some important information was, or reminded you of an anniversary coming up.

Add these little life-savers to the daily contributions that we all take for granted and you can appreciate why April 22 should be a big day. What's April 22? National Secretaries Day, fella. And should you need a whole week to tell your secretary how much you appreciate her, try April 19 through April 24. But tell her!

About the ads . . .

A four-page classified ad supplement was scheduled to be distributed today, April 10, with Plane News. But alas, you didn't send in enough ads to fill it. So watch for it next Friday, April 17. (That way, you can give the ads your undivided attention.) Plane News will be out again April 24.

GRUMMAN, April 10, 1970

Lovell, Haise, Mattingly await launch of Apollo 13

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it this way: Lovell and Haise are to land in a "valley" surrounded by craters, ridges, steep hills, and enormous boulders (or so previous photos indicate). And they're scheduled to pull that off after making just one eight-mile-high-pass over the area. Second time around, the Command and Lunar modules separate, the former to be dubbed Odyssey, the LM to be Aquarius. (One reason for making such close-to-the-moon orbit, by the way, and then releasing the LM for landing, is to conserve LM's fuel and provide about 14 seconds more hover time.)

If Fra Mauro presents formidable obstacles for landing, it may well be asked: Why try it at all? The answer to that is, geologically, Fra Mauro is thought to be an area in which moon rocks date back more than four billion years—or, roughly, as far back as the origin of the moon and our solar system. The knowledge that could flow from that may well prove invaluable.

Lovell and Haise's work area will lie about 110 miles east of the point in the Ocean of Storms where LM-6 landed. And work they will! Once Lovell sets foot on the moon (set for 2:23 a.m. Thursday, April 16), and Haise does the same about 15 minutes later, they'll set up some scientific instruments, including a seismometer similar to one carried on the previous flight. That Apollo 12 LM-6 seismometer, by the way, is still on the job, sending back to earth information on shock waves created by moonquakes and strikes by meteors and meteorites—data from which geophysicists infer some of the moon's inner structure.

New job for rovers

A special new job for the moon rovers—each of whom has about 4½ hours' lunar-stay time on each of two trips—will be to drill three 10-foot holes into the lunar surface with a hand-operated battery-powered drill. The idea is to sink two probes to gauge the temperatures (and temperature changes) at different levels in the moon and to judge the day-night differences. It's possible that these probes will furnish hints (if not hard evidence) as to whether the moon is cooling and whether it has a molten core such as the earth's.

The third of the probes is designed to extract soil samples.

Another potential discovery point will be along the rim of a crater (where the oldest rocks should be found) some 150 feet deep and 900 feet wide. According to Lovell, a recent meteor gouged out the crater, which has rocks in it the size of automobiles.

So, after Lovell and Haise have de-

played their experiments, brought rock and soil samples back to Aquarius, roamed the moonscape, taken photographs—and provided TV spectaculars from Fra Mauro—they set about closing up shop for the "Apollo 13 day" and leave the moon with a sort of heave-ho after rendezvous with Odyssey: an attempt to "drop" Aquarius between the two seismometers to test impact reaction. The Apollo 12 LM-6 crew managed a similar feat by aiming their vehicle on a collision course with the moon after rendezvousing with the Command Module. It set up moon tremors that lasted almost an hour, although a comparable impact on earth would last for only about five minutes.

Back in the Command Module, they'll count the hours as they fly home, to be quarantined for about 21 days, and then—!

But now, April 10, the day before scheduled liftoff, thoughts are on the impending journey... and here at the Cape, at Houston, at Bethpage, at spots all over the globe, there's the excitement... and the questions: Will there be good weather, for if there isn't, the shot's off? And the "launch window"—just three hours in which to lift off... otherwise we all wait until May... We'll see.



Ride into history. Apollo 13 crew members, Jim Lovell, Tom Mattingly, and Fred Haise, are scheduled to blast off April 11, on start of third lunar landing mission. They are seated in front of scene of the Lagoon Nebula, with the mission insignia and two items of early navigation equipment in the foreground. (NASA photo)

Apollo 13 time table

DAY	DATE	EST	GET	MAJOR EVENTS	TV COVERAGE
Sat.	4-11	2:13 p.m.	00:00	Launch	Launch
		4:48 p.m.	02:35	T.L.I. (Trans-Lunar Injection)	
		5:28 p.m.	03:15	Transposition Docking and Ejection	1 hour 08 minutes
Sun.	4-12	8:28 p.m.	30:15	Spacecraft interior	30 minutes
Tues.	4-14	12:13 a.m.	58:00	Interior of LM (LM familiarization)	30 minutes
		7:38 p.m.	77:25	L.O.I. (Lunar Orbit Insertion)	
		11:58 p.m.	81:45	D.O.I. (Descent Orbit Insertion)	
Wed.	4-15	3:13 a.m.	85:00	LM housekeeping	
		2:03 p.m.	95:50	Landing site TV	15 minutes
		5:29 p.m.	99:16	Undocking and separation	
		9:43 p.m.	103:30	P.D.T. (Powered descent initiation)	
Thurs.	4-16	9:55 p.m.	103:42	Touchdown lunar surface	
		2:23 a.m.	108:10	EVA 1 begins	3 hours 52 minutes
		6:03 a.m.	111:50	EVA 1 ends (Open ended)*	
		10:08 p.m.	127:55	EVA 2 begins	6 hours 35 minutes
Fri.	4-17	1:48 a.m.	131:35	EVA 2 ends (Open ended)*	
		7:22 a.m.	137:09	Liftoff - Ascent Orbit Insertion	
		10:36 a.m.	140:23	Docking	12 minutes
		11:03 a.m.	140:50	Hard docking	
Sat.	4-18	1:17 p.m.	143:04	LM jettison	
		12:26 a.m.	154:13	CSM plane change for photography	
		12:23 p.m.	166:10	TV of lunar surface	40 minutes
		1:41 p.m.	167:28	T.E.I. (Trans-Earth Injection)	
Mon.	4-20	2:13 p.m.	168:00	TV of lunar surface (Post - TEI)	25 minutes
		7:58 p.m.	221:45	Earth and interior TV	15 minutes
Tues.	4-21	3:13 p.m.	241:00	Splashdown	

* Note: Either Extra Vehicular Activity 1 or 2 can be extended 30 minutes.

TV coverage

Grumman consulting pilots will join with a Columbia Broadcasting System team in Plant 4 to show the what and how of the Apollo 13 flight. A LM mock-up is there, along with a simulated moon landing area. Other Grumman consulting pilots will also be aiding NBC and ABC teams to interpret mission events.

It's a woman's world: Carol Bensel finds back-seat driving is not only fun, it's important, too

Some of her friends don't know what kind of work she does, and perhaps wouldn't understand it if they did. Others—psychologists and space specialists—think it not so very strange that a girl should be doing research on how to drive a vehicle on the moon.

Carol Bensel, tall, with blue eyes and gold-blond hair, works in Life Sciences, Plant 5, as a human factors psychologist. She came to Grumman in December of '67 with a fresh new PhD from the University of Massachusetts, where for four years she had been doing graduate work and teaching and conducting research in experimental psychology. Her studies were physiological as well as psychological; she was looking into human balance and the response of a subject to artificial stimuli of the inner ear. Or as Dr. Bensel phrases it, "We used a systems approach to analyze human sway in response to electrical stimuli of the vestibular apparatus," the ultimate intent being to aid persons with balance problems.

Why did she elect to come to Grumman following her graduate work at the University? "The Company seemed to be doing pioneering work in space," she explains. "And since I wanted to be in industry and liked the metropolitan area with its museums and theaters, it all appeared promising." She loves the beach and enjoys plays and movies and reading, but



Back-seat driver. Dr. Carol Bensel, Life Sciences, Plant 5, guides simulated lunar rover in lab to gain data on 'driving' unmanned vehicle, by remote control, on future lunar missions. (Photo by Fred Annette)

the job is important to her, and always interesting. In her first two years with Grumman she had a go at working on LM derivatives (for longer lunar stays) and the Apollo Telescope Mount, where a crew might exist in zero G condition over a prolonged period.

The most pressing task facing her right now is organizing a mountain of material and drafting a

long report for the National Aeronautics and Space Administration on a documented Grumman study of a simulated lunar roving vehicle operated by remote control. As she sat in a cubicle in the lab underneath Plant 5's "blue ball," she was completely relaxed, although the report is due in July. "I'll sit and think 'til this falls into place," she said lightly.

A long report doesn't actually phase her; she says she's been writing on technical subjects ever since high school. Instead of knitting or crocheting for diversion, she writes "for publication some day."

The problem of operating a vehicle on the moon 240,000 miles away is that there is a 2.6 second time lag from earth. A great deal of learning must take place in order for a "driver" on the earth to be able to anticipate the turns and changes of speed necessary for the vehicle on the moon to reach its lunar destination in safety. Because of the time lag, his commands to the unmanned rover reach it 2.6 seconds "late."

Electronic assist

An electronic "predictor" that shows up on the television screen as a white horizontal line like a floating cigarette has been introduced into the TV picture of the lunar surface to show where the vehicle is going to be 2.6 seconds hence. "There have been other predictors, but ours is one of the more sophisticated devices in the way it responds," Carol explained.

After the completion of this NASA study, there will be another, using Grumman's full-scale lunar roving vehicle on the simulated lunar landscape at Calverton. One purpose of that study will be to see if simulated sounds of acceleration will help the "driver" analyze vehicle speed and thus perform better. The driver will handle the controls in the closed circuit TV room at Plant 5, Bethpage, to operate the actual vehicle in delayed mode at Calverton's lunar test site.

Dr. Bensel looks forward to that day when a lunar rover, operated by an expert from earth, will crawl across the face of the moon without falling or tipping or blundering into a rock. She'll feel she had a modest share in its success.

And if you should encounter her around Plant 5, don't worry about the doctorate. "Just call me Carol."



Da Nang, Vietnam—Aviators of Marine All-Weather Attack Squadron VMA(AW)-242, chalked up a record recently by logging their 15,000th combat mission in less than 3½ years.

Since its arrival in Vietnam in November, 1966, the squadron has averaged over 12 combat missions per day in the versatile A-6A Intruder, accumulating 19,451 combat flight

hours and dropping 76,650 tons of ordnance. The record tops all other Navy and Marine Corps A-6A squadrons in Vietnam.

Lt. Col. Stan Lewis, commanding officer of VMA(AW)-242, and his bombardier/navigator, 1st Lt. Jim Ewing Jr., were congratulated by Maj. Gen. William Thrash, commanding general, 1st Marine Aircraft Wing,

following the accomplishment.

Shortly after arriving in Vietnam, VMA(AW)-242 set a 1st Marine Aircraft Wing monthly ordnance dropped record of 1,132 tons in 319 missions.

The squadron's air role in Vietnam includes armed reconnaissance, direct and close air support, and ground controlled radar bombing, in all weather elements.

CALENDAR of events

Notice of events for period April 24 - May 8 should reach Plane News by Tues., April 14.

Amer. Inst. of Aero. & Astro.: Thurs., Apr. 23, 6 p.m., Plant 30 Cafeteria. Dinner mtg. Spkr. Capt. M. Ames, U.S. Navy, F-14 Program mgr. on "Air Superiority Aircraft in the Decades of the 70's & 80's." Mrs. J. Smart. 595-3086.

Chess Club: Tuesdays, 5 p.m., Plant 3 Cafeteria. Tournament, games. C. Wilkie, Ext. 9941.

Coin Club: Wednesdays, 12:05-12:50, Plant 25 Vendor Conf. Rms. Irv Atkins, Ext. 1874.

Family Campers: Fri., Apr. 24, after 4 p.m., Peconic picnic area. First campout. Phil Giacini, Ext. 57-247.

Fencing Club: Wednesdays & Fridays, 5 p.m., Plant 30 Cafeteria. Joe Campisi, Ext. 1134.

Horseback Riding Club: Every Sun., 11 a.m., By-Ways Stables, Round Swamp Rd., Huntington. Caren Carlson, Ext. 2725.

L.I. Ind. Nurses Assoc.: Thurs., Apr. 16, 8 p.m., Plant 28 Audit. Bus. mtg. Mary Glise, Ext. 1768.

Research Lecture Series: Wed., Apr. 15, 7:30 p.m., Naval Reserve Intell. Unit 3-1-9, Garden City. Spkr. Kenneth Leib, on "Lasers in Naval Applications." Arthur L. Lind, Ext. 2854.

Soc. of Aero. Mat'l. & Process Eng. (SAMPE): Tues., Apr. 14, 5:30 p.m. (happy hour) 7:30 p.m. (meeting), Kings Grant Motor Inn, Exit 46, L.I.E. Spkr., T. Mika, Hysol Div. of Dexter Corp., "Polymers & Their Effects on Adhesive Properties." Caren Carlson, Ext. 2725.

Ski Club: Wed., Apr. 15. Reg. mtg. Bill Brennan, Ext. 3451.

Stamp Club (Bethpage): First 3 Wednesdays of month, 5 p.m., Plant 30 Cafeteria. Swapping, circuit bk. sales, auctions. Harold Haug, Ext. 3473.

Stamp Club (Peconic): Wed., Apr. 15, noon, Plant 6, Conf. Rm. Discussions, prizes, trading. Floyd Franklin, Ext. 57384.

GRUMMAN, April 10, 1970

Wearing of the greens

It will be a grand season for golf this year.

Mike Cherry, the GAA's golf pro, estimates that more than 1,000 guys and dolls will be chipping and chopping in Grumman leagues when the season gets underway during the week of April 27. Some 47 leagues will be in operation, including circuits at Cape Kennedy, Stuart, Fla., and Savannah, Ga. The GAA program has 31 leagues using Bethpage State Park, seven at Commack, and other groups playing at Middle Island, Huntington Golf & Tee, and Hauppauge.

On the tournament trail, Mixed Pinehurst events have been planned at Bethpage on June 24, July 22, and August 26, with Kicker's events on June 9 and August 11.

Tryouts for the Grumman varsity, perennial L.I. Industrial League champions, will be staged over a 54-hole route on May 13-18-20.

Oliveri, Berka riding the range to rope National pistol honors

Two members of the Grumman Security Force made their mark in the Mid-Winter National pistol competition at Tampa, Fla., bringing home two championships and a total of six awards.

Lt. Joe Oliveri won the .22 caliber aggregate title in Unclassified shooting, and Guard Al Berka won the .38 caliber Rapid Fire crown in the Master Police event.

Oliveri was second in the .38 caliber Master Police National Match course, while Berka won three other awards in addition to his championship trophy. Berka was second in the Master Police .38 caliber Timed Fire, second in the .22 caliber Timed Fire, and third in the .22 caliber Slow Fire at 50 yards.

Both Oliveri and Berka are members of a Grumman Rod & Gun Club pistol team.

Mancuso rattles pins with 289 game

What started out to be an ordinary game for an "ordinary" bowler turned out to be anything but that the other night as the Avionics loop rolled into action at Syosset Lanes. George Mancuso of Plant 33, a 167-average flipper, got a spare in the opening frame of his second game, and then went off like a buzz-saw. He rammed home 10 consecutive strikes, clipped nine pins on his last ball and wound up with a 289, second highest of the Grumman season, topped only by Bob Ruotolo's 300 on the same lanes some weeks ago. Mancuso totaled 666, and both his scores were Avionics' records. . . . George Ulrich, winning 18 out of his last 20 matches, moved to the top in Masters league individual play, which also saw Johnny Alston crack a 275 and John Betterino use 247 and 242 games for 847, the top four-game string in recent rounds. . . . The usually quiet Frank Wassung made a lot of noise in the Classified frolic, booming a 262 and 677, only four sticks off Ruotolo's league record. In the same round Jim Tracy rolled 245-641. . . . That man John Betterino was also red-hot in the Black league, socking a 657 series. . . . Tom Wright missed tying Dom Sassone's record by one pin when he threw a 265 game in Trader tiffing. . . . Jean Maresca pushed out a 561 series in the Monday Mixed to break Rhonda Hoffman's mark by 17 pins. . . . Vinny Mirabella picked up all the chips in the Woodbury Mixed, setting two records with a 264 game and 636 series and erasing Hal Lessman's records. . . . Howard Strohl made the top of the list for the Nite Owls with 245-647. . . . Mark Mellinger's 192 average looked even better as he hooked a 237 into a 642 Gray series. . . . Tom Petrosino locked onto a 244 game that carried him to a 635 Hellcat series, shading Johnny Alston by two pins. . . . Tom Smith scratched out Pete Caruso's Hellcat record with a 255 game.

Campagne, Alaimo table tennis kings

Tony Campagne paddled his way to the singles title in GAA table tennis at Plant 33, Syosset, slicing straight through the field without losing a game in five matches. He defeated Lionel Wellington in the final, 21-18 and 27-25. Wellington had climbed back from the losers' bracket after bowing to George Harrington in an opening-round test. . . . Tony Alaimo became the king of the hill in Plant 27 table tennis at Wyandanch by beating Harold Corley twice in showdown matches. Alaimo topped Corley in the winners' bracket final, 21-12, 21-17. After Corley ousted Lennie Trefaro in the double elimination competition, he yielded again to Alaimo, 21-12, 21-11. . . . The Armstrongs won the Nite Owl volley ball crown at Plant 7, Calverton, defeating the Babies in the playoffs. Top trophy winners were Jerry Morello, Art Baldwin, Bob Bryner, Tom Cuce, John Galante, Charlie Facciani, and Lowell Naef. . . . Bill Hejl and Francis Bennett rallied after losing the first two games to defeat Herman Michaels and Artie Bowden for the shuffleboard title at Plant 29. . . . The Gulfstreams remained in first place in the Sharpshooter division of the Industrial Pistol league by outmarking IBM, 1018-1005, with Paul Pantason top gun at 259. The Hawkeyes continued their climb in the same league with a 1009-962 decision over Republic for their sixth straight victory.

Men's varsity 5th in pin sizzler; Nielsen led Grumman scoring

Now it looks like it's all up to the women's varsity to bring a ray of sunshine into the Grumman Industrial bowling picture. The girls start shooting this weekend for the Long Island title at Mid Isle Lanes, Hempstead.

The men's varsity finished 5th in the annual 16-team event, won by Kollsman and highlighted by Newsday's Incentive record of 759 pins over average. Kollsman won with 10,660 sticks and a 46-pin edge over Newsday. Grumman rolled 11,133, only 160 sticks off the pace, but a score good enough to win 11 of the previous 28 classics.

"This was the closest event we've ever had," said GAA Director Bob Benn. There have been tighter finishes between first and second, but this time at least five teams had a shot at the title midway through the last game.

Jack Nielsen was top Grumman kegler in the tourney, finishing second by 90 pins to John Koehler of Newsday, who shot 2491. Nielsen had a 200 average.

Johnny Alston, shaking out of his tournament slump, shot 659 for Grumman in the men's Industrial finale.

Newsday's Koehler not only won total wood, but had the two top series of the event with 682 and 667. Howard Herman of Sperry rolled the high game of the 29th tourney, 288. In the team bracket, Newsday had top game of 1036, and Kollsman had high series of 2900.

The Grumman Hellcats, topped by Henry Kwiatkowski's 545, rated fifth after the first round of Nite Owl play, while the Mohawks were sixth despite Ernie Jenkins' 595. Republic was the first-round leader.

Collegians take giant cage step

The Spoilers have packed away the Wednesday League crown and the Collegians are headed full speed down the pike toward the Tuesday title as basketball fades out of the sports scene.

Ray Schaefer's Spoilers won the circuit honors for the fifth straight season, whipping the Intrepids, 110-70, in the first Wednesday playoff, and then gaining the tiara on a forfeit in the second contest.

The Collegians drew a bye in the opening playoff round in the Tuesday frolic while the Newcomers were eliminating Transportation. Then the Collegians stepped toward the title with a 108-102 win over the Newcomers as Bob Scully was the star with 35 points, although game honors went to the Newcomers' Frank Quarto with 37. John Ebron and Gary Pike scored strongly and controlled the boards for the Collegians.

Previously, the Newcomers beat Transportation, 104-84, and 101-87. Dick Mroz and Bob Mischo excelled for the Newcomers in the opener, along with Quarto, who netted 32. Brian Berke of Transportation hit for 27. Ed Krol sparked the Newcomers in the second duel with 28 points, while Richie Caruthers shot 30 for the losers.

Court cases

Grumman's top-ranking net stars will find out just how the ball bounces early next month when Coach Mitch Rosenbaum will hold tryouts for the varsity tennis team. The sessions are scheduled for Monday, May 4, and Wednesday, May 6. The trials will be at Bethpage State Park, each starting at 5 p.m.

Rosenbaum stressed that no one will be considered for the team unless he attends both tryout sessions. Rosenbaum is situated in Configuration Data Management, Plant 36, and may be contacted on Ext. 6213.

The Grumman net team has won the L.I. Industrial League title the past seven consecutive years.

Rizzuto climbs to 'table' top

That old saw, "If at first you don't succeed. . . ." brought a big cut of success to Chris Rizzuto of the Plant 3 Machine Shop.

Rizzuto failed in five previous tries for the Bethpage Class A singles title, but he finally made it with a flourish last week and won the GAA table tennis tournament.

Chris left no question about his mastery, beating defending Ted Wakulinski of Plant 5 in the second round, 21-19, 21-14, and then defeating talented Fred Danner in the two showdown matches of the double elimination event.

Rizzuto beat Danner in the finals of the winners' bracket, 21-13, 8-21, and 21-18. Danner topped John Squicciarino, last year's doubles king, 21-16, 21-12, to earn the right to again meet Rizzuto, but fell in the title match, 21-19, 21-18. On the way to the title, Rizzuto also defeated Ralph Palomba, 21-10, 21-17.

Squicciarino had previously eliminated Wakulinski, 22-20, 13-21, 23-21.

Club will flounder at Montauk May 3

The season's first salt water fishing trip sponsored by the Grumman Rod & Gun Club has been planned for Sunday, May 3, at Montauk Point. The Grumman party will have accommodations aboard the 65 ft. "Jigger III."

Fishing will be for snowshoe flounder, blackfish and the spring run of codfish. Reservations are to be made with Walter Schillinger, Plant 15, who can be contacted on Ext. 9568 or 9253. Schillinger is the Club's salt water fishing chairman.

Help yourself and America— Buy U.S. Savings Bonds

Bob Hope, staunch backer of U.S. Savings Bonds, fires up the imagination when he proclaims, "Sixty-three cents a day buys a \$25 Savings Bond a month"—and that's the truth.

Can you picture what it would do for your own personal economy to be getting a \$25 Savings Bond in the mail every month, with some spare change left over? Good for a payment on a house. Or a car, or a boat. A help toward future college tuition.

Grumman is one of thousands of companies backing the Government, an effort that can "Help Build A Better America." Last year people at Grumman, buying bonds through the Payroll Savings Plan, logged 80% participation. This year, the goal is 100%. "If Boeing can rack up 94%, what's to stop Grumman?" says Gus D'Errico of Employee Services, head of Grumman's campaign.

By last week, 1800 of the 3000 subscribers needed for 100% participation had joined the Grumman effort.

Prize attraction

Have you lost the card you received with your paycheck? Ask for another at any Employee Services Office. Sign up. Any amount is OK, says D'Errico. The more you save, the faster your bonds will roll in. And whoever is enrolled in the Payroll Savings Plan when the campaign ends will be eligible for one of 24 valuable prizes the Company is offering as a sizzling incentive. They range from color TVs to stereos and refrigerators and dishwashers.

E-bonds used to earn 4¼%. Now they earn 5%, compounded semi-annually when held to maturity of five years and 10 months. (They earn 4.01% the first year; from that point on, they earn 5.20% if held to maturity.)

Check these other considerations in deciding whether to enroll for the first

time, or to increase your deduction:

- Convenient
- Regular
- Automatic
- Safe
- Defense against inflation
- Tax advantages

The reasons are many. For booklets and descriptive information, see any Grumman Employee Services representative.

A sampling of opinion among purchasers of bonds through Grumman payroll deduction showed a variety of personal ideas:

Matthew Baione, Manufacturing Inspection—5: I've just increased my payroll deduction for Savings Bonds. The way I feel about them—

I'm serving myself by investing. And it's a way of backing up our service men. As long as the Government feels that buying bonds helps the economy, I'm for that.



Carol La Nier, Personnel Records—28:



Savings Bonds are just a very handy way of saving, and I think they're a good investment. They're my "panic fund." If I had to take money out of my pocket in an emergency, it would be rough. So I buy

bonds, and I've been doing it on the Payroll Savings Plan for a couple of years.

Alfred Weismantel, Tanks & Ducts—3: I

increased my bond buying quite substantially. With four girls and three boys to educate, I'm all for an investment that is as sure as this one and pays a 5% return. To my way of thinking, Savings Bonds on the Payroll Savings Plan are the only way to save. What you don't see you don't spend.



Robert Wesolowski, Power Plant—6: I



have more than doubled the amount I was investing in bonds. I had cashed in the bonds I bought when I was in service, to pay for my new home. Then I subscribed to Freedom Shares for a while, as well as

bonds. Now I've converted the Freedom Shares to E Bonds and am happy to do it.

Beatrice Cameron, Space Finance—25:

My husband, who works in Facilities Engineering, Plant 30, buys bonds, and I decided to buy them too. It's such a painless way of saving. It seems to me you're far more likely to hang onto your savings if the money is where you don't see it than you are if you can run to the bank when you want a little cash.



Raymond McGrath, P/S Site Supply Management—30: It



certainly is a convenient way to provide for my young children's education. You just arrange to have an amount deducted regularly, and suddenly, there's a bond in the mail. I worked

at KSC for 2½ years and felt very close to NASA and the Government down there. You like to cooperate.

Delivering the goods!

Special delivery service is one thing—special presidential service is yet another! And that's just what LM-7 got last week as it sat on Pad 39A at Kennedy Space Center awaiting final countdown for its launch tomorrow. Word of a critically needed part for LM-7 reached Evans as he was about to leave Bethpage aboard a corporate twin-jet Gulfstream II for a discussion on the upcoming lunar mission at the Cape.

Lew volunteered to deliver the part personally, and thus added a very special link in the long chain of events leading to the launch of Apollo 13. Lew Evans is shown at right delivering the goods at the Cape to George Smith (C), LM-7 logistic technician, and Walt Mooney (R), logistic supervisor.



plane GRUMMAN news

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